

CLAIMS

- Sub 88
1. A tissue implant device configured to resist migration in the tissue.
2. A tissue implant device as defined in claim 1 further comprising a flexible body having proximal and distal portions each defining a profile, the proximal end having a larger profile than the proximal end.
3. A tissue implant device as defined in claim 2 wherein the flexible body defines an exterior, a hollow interior, and at least one opening between the interior and exterior.
4. A tissue implant device as defined in claim 3 further comprising: a tail at the proximal portion.
5. A tissue implant device as defined in claim 4 wherein the tail defines a profile that is larger than the distal portion of the body.
6. A tissue implant device as defined in claim 5 wherein the tail is configured to remain at the tissue surface when the device is implanted.
7. A tissue implant device as defined in claim 5 wherein the tail is configured to be implanted in the tissue when the body of the device is implanted.
8. A tissue implant device as defined in claim 2 wherein the flexible body comprises a helical spring.
9. A tissue implant device as defined in claim 1 wherein the device is configured to resist migration by exhibiting adequate longitudinal flexibility to substantially absorb migratory forces placed on it by the surrounding tissue.
- Sub 89

- 16 -

10. A tissue implant device as defined in claim 9 wherein the flexible body comprises a helical spring.

Sub B10
11. A tissue implant device as defined in claim 1 further comprising a surgical adhesive associated with the device.

12. A tissue implant device as defined in claim 11 wherein the surgical adhesive is associated with the device after the device is implanted in tissue.

13. A tissue implant device as defined in claim 8 wherein the helical spring has varying flexibility along its length.

14. A tissue implant device as defined in claim 8 wherein the helical spring is formed from a filament having varying modulus of elasticity.

15. A tissue implant device as defined in claim 13 wherein the filament is comprised of a plurality of materials of varying moduli of elasticity.

16. A tissue implant device as defined in claim 13 wherein the varying flexibility is created by varying the distance between individual coils of the helical spring.

17. The tissue implant device as defined in claim 13 wherein the helical spring is formed from a filament having a varying thickness along its length, which creates varying flexibility along the length of the helical spring.

Sub a1
18. A tissue implant device as defined in claim 7 wherein the flexible body comprises a helical spring and the tail is formed by a more broadly wrapped coil adjacent to the proximal portion of the body forming an arm that extends laterally from the longitudinal axis of the device in the diameter of coils that comprise the body of the spring.

- 17 -

19. A tissue implant device as defined in claim 18 wherein the flexible body comprises and helical spring the tail is deformed to be out of plane with the helical orientation of coils comprising the body of the spring.

Sub B12 > 20. A device as defined in claim 8 wherein individual coils of the helical spring have a constantly increasing diameter from the proximal portion to the distal portion.

21. A tissue implant device as defined in claim 8 wherein coils of the distal portion define a constant diameter and coils of the proximal portion define an increasing diameter in the proximal direction.

Sub B13 > 22. A tissue implant device as defined in claim 6 wherein the flexible body comprises a helical spring and the tail comprises a broadly wound most proximal coil of the spring having a diameter that is greater than the diameter of coils of the body of the device.

23. A tissue implant device as defined in claim 22 wherein the broadly wound coil is concentric with the body of the device.

24. A tissue implant device as defined in claim 22 wherein the broadly wound coil has a center which is offset from the longitudinal axis of the body of the device.

25. A tissue implant device as defined in claim 22 wherein the tail includes a proximal end of the spring and the proximal end is secured to the broadly wound coil.

Sub B14 > 26. A tissue implant device as defined in claim 25 wherein the proximal end is joined to the broad loop by being wrapped around the loop.

- 18 -

27. A tissue implant device as defined in claim 26 wherein the proximal end of the coil extends distally from the broad loop coil after it has been wrapped about the broad loop coil to serve as a barb.

5 28. A tissue implant device as defined in claim 25 wherein the proximal end is joined to the broad loop coil by welding.

29. A tissue implant device as defined in claim 25 wherein the proximal end of the coil is joined to the broad loop coil by a malleable sleeve crimped around the
10 proximal end and broadly wound coil to secure the proximal end to the coil.

30. A tissue implant device as defined in claim 22 wherein the broadly wound core is non-circular.

15 31. A tissue implant device as defined in claim 25 wherein the broadly wound coil is joined to the body of the device by a neck portion.

32. A tissue implant device as defined in claim 31 wherein the neck comprises at least one straight segment.
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33. A tissue implant device as defined in claim 31 wherein the neck comprises a coil lying in a plane that is substantially parallel to the longitudinal axis of the device.

25 34. A tissue implant device as defined in claim 8 wherein the helical spring is formed from a filament having a non-circular cross-sectional shape.

35. A tissue implant device as defined in claim 34 wherein the cross-sectional shape of the filament is rectangular.
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- 19 -

36. A tissue implant device as defined in claim 35 wherein the major axis of the rectangular cross-section is substantially perpendicular to the longitudinal axis of the device.

5 37. A tissue implant device as defined in claim 35 wherein the major axis of the rectangular cross-section is at an acute angle to the longitudinal axis of the device.

10 *Sub B15* 38. A method of implanting a tissue implant device comprising:
providing an implant device having a flexible body with proximal and distal ends and an anchoring tail at the proximal end;
providing a sharp tip delivery device configured to penetrate tissue and releasably retain the tissue implant device;
15 associating the implant device with the implant delivery device;
accessing the desired tissue implant site;
applying a penetrating force to the implant and implant delivery device combination such that the combination penetrates tissue to a clinically effective penetration depth to implant the device;
20 withdrawing the implant delivery device from the implanted implant device.

25 39. A method as defined in claim 38 wherein the implant device and delivery device combination is rotated while penetrating forces are applied to screw the device into the tissue.

40. A method as defined in claim 39 wherein the tail of the implant device is submerged below the surface of the tissue after implantation.

30 41. A method as defined in claim 39 wherein the tail of the implant device remains exposed at the surface of the tissue after implantation.

- 20 -

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no method
42. A method of implanting a tissue implant device to promote angiogenesis within a tissue comprising:
providing a tissue implant device configured to be anchored within tissue so that it does not migrate from the tissue after implantation.

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43. A method of implanting a tissue implant device as defined in claim 42 wherein the device is delivered percutaneously.

44. A method of implanting a tissue implant device as defined in claim 42
10 wherein the device is delivered transthoracically to the intended tissue location.

45. A method of delivering a tissue implant device as defined in claim 42 wherein the device is delivered surgically to the intended tissue location.

46. A method of anchoring a tissue implant device within tissue comprising:
providing an implantable body;
providing a delivery device configured to carry the implantable body to an intended tissue location and implanting the device in tissue;
associating the body with the delivery device and implanting the body in
20 tissue at the intended location;
applying a surgical adhesive at the site of the implant to secure the body to the tissue.

47. A method of implanting an implant device as defined in claim 46 wherein
25 the surgical adhesive is applied to the implant site by the delivery device after implantation.

48. A method of delivering an implant device as defined in claim 46 wherein the surgical adhesive is applied to the body prior to implantation.

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49. A method of implanting an implant device configured to resist migration in tissue comprising:

- 21 -

providing a flexible spring body implant device having sufficient longitudinal flexibility to absorb migratory forces applied on the device by surrounding tissue after implantation;

inserting the flexible spring body into tissue.

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